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PHYSICAL, CHEMICAL AND BIOLOGICAL DATA, CLIMAX I EXPEDITION, 19--ETC(U)
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UNIVERSITY OF CALIFORNIA SCRIPPS INSTITUTION OF OCEANOGRAPHY

data report

PHYSICAL, CHEMICAL AND BIOLOGICAL DATA

CLIMAX I EXPEDITION

19 September - 28 September 1968

N00014-69-A-0200-6049

SIO Reference 74-20
1 September 1974 Date

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7 October 1974

ERRATA

The ship's name was inadvertantly entered RV ARGO. It should be replaced with RV HORIZON.

UNIVERSITY OF CALIFORNIA

SCRIPPS INSTITUTION OF OCEANOGRAPHY

PHYSICAL, CHEMICAL AND BIOLOGICAL DATA

CLIMAX I EXPEDITION

19 September - 28 September 1968

Cruise Sponsored by:

National Science Foundation
Marine Research Committee

Data Processing and Analysis Sponsored by:

Office of Naval Research
Sandia Corporation
Marine Research Committee

SIO Reference 74-20

Approved for distribution:

W. A. Nierenberg, Director

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CONTENTS

INTRODUCTION

Many of the earlier biological studies of the Central North Pacific Water mass have been of an exploratory nature. Expeditions NORTHERN HOLIDAY (1951), TRANS-PAC (1954), NORPAC-POFI (1955), URSA MAJOR (1964), and ZETES (1966) have all surveyed this area. One of the results of these surveys was the discovery of very abrupt latitudinal faunal discontinuities in mid-ocean. The fauna and flora of the North Pacific Water mass was found to differ strongly from that of the Subarctic Water mass and from the transition domain. There are also important differences from the Equatorial Water mass. Further, in samples taken within the gyre-like circulation of the Central Water mass the homogeneity of species content of macrozooplankton, phytoplankton and necton is great relative to other planktonic environments (McGowan 1971). The standing crops of organisms here are always low and do not appear to vary greatly, either spatially or temporally (McGowan and Williams, 1973). The dimensions of this area are approximately 1200 by 4500 nautical miles, thus it represents a significant fraction of the Pacific Ocean.

The temperature and salinity structure of this area, as determined from the early cruises listed above, also indicates a certain monotony of hydrographic conditions as do measurements of phosphate, silicate and oxygen. Although there are seasonal variations in these properties in the upper layer, the range is comparatively small and there is little spatial heterogeneity for large parts of the year.

Because of the regularity of the distributions of both biological and physical variables and the lack of evidence of any large-scale horizontal advection of either biological or physical-chemical properties, the central gyre of the North Pacific was selected for a long-term study of community structure and function. On the basis of biogeographic studies the central gyre has been determined to be an independent faunal province. An area in the vicinity of 28°N 155°W was selected as the "center" of the eastern half of the gyre. At this locale we planned an intensive series of biological and physical measurements designed to reveal aspects of the structure and function of the community. Our assumption was that samples taken here would be representative of a much larger area within the gyre itself.

The first cruise of this series was Climax I and its specific purpose was to investigate the vertical distribution of phyto-

plankton and macrozooplankton species, microzooplankton biomass, temperature, salinity, oxygen, nutrients, chlorophyll-a, primary productivity and light. The tactics used were to follow a pair of parachute drogues for a period of about eleven days while taking replicate measurements of these properties. Two drogues were used in order to ensure that complicated circulation patterns were not present and that small scale eddies would not disperse the properties being measured. If the drogues remained together and followed the "same" track as they drifted, it was taken as evidence that the sampling, done between the drogues, was in a reasonably coherent body of water.

DAILY ROUTINE

The daily routine of sampling while following the drogues consisted of Bongo net tows taken at 6 or 8 depth ranges throughout the (24 hour) day. The maximum depth reached was 600m. Microzooplankton pumping from 5 depth ranges was done mainly in the early morning, late morning and early evening hours. The maximum depth reached was 200m. Samples of water from the pumping device were taken for nutrient, chlorophyll-a and phaeo-pigment analyses. Continous salinity, temperature, depth profiles (S/T/D) were taken in the late morning, near noon and early evening hours. Bottle casts for nutrients, chlorophyll-a and phaeo-pigment analyses were made in the late morning and early evening. Submarine photometer and secchi disc lowerings were made near local apparent noon. Simulated *in situ* productivity measurements were done daily from local apparent noon until sunset. A few continuous traces of phosphate, using a flow of water from the microzooplankton pump, were made with an autoanalyzer. Continuous tracings of *in situ* "chlorophyll" fluorescence were also made. Echo sounding was done during the early morning and evening hours for records of the deep scattering layers. Visual sightings of birds, mammals and fish schools were made. Weather and sea state were recorded.

THE DROGUES

The original plan was to place three parachute drogues in a triangular configuration, 5 miles on each side. The parachutes were set at 10m depth. These three drogues were set in place on the afternoon of 18 September, 1968. At 0540 on 19 September the position of the drogues was determined by celestial navigation for #1 drogue (27°00'N, 155°18'W) and by radar bearings from #1 to #2 and #3 (Fig. 2, inset).

These three drogues moved together in a westerly direction at

speeds up to 1 knot. However, on the morning of 21 September they slowed down, and changed direction to the southwest. During the time of the direction change (between 0040 and 0550) #3 drogue sank. Shortly thereafter #2 drogue sank so that by 1300 on 21 September we were following only one drogue. This drogue (#1) changed direction again and began to move slowly to the northwest during the afternoon of that day. It continued to move slowly that night. During the morning of 22 September we were able to install a fourth drogue about 4 nautical miles to the east of #1. These two drogues (#1 and #4) moved as a pair in a northwesterly direction until 28 September when we terminated our study and purposely sank the drogues (Fig. 2).

Thus the sampling, which began on 19 September, was done at first in the center of the triangle, then for a short distance near one drogue only, and finally, between a pair of drogues. Because of the very short distance traveled between the time #2 drogue sank and the time of insertion of #4 drogue, this may be considered a continuous series of samples, with little or no dispersal of the water the drogues were tracking. The distance traveled by #1 drogue was 186.6 nautical miles. Table 1 shows wind directions and speeds during the entire eleven day period. Table 2 shows distance traveled and speed of the drogues during the same period.

METHODS

Macrozooplankton

The macrozooplankton was sampled with Bongo nets (McGowan and Brown, 1966) of 505μ mesh. This is a paired net with each net of the pair having an area of $0.396m^2$. The depth range of the samples was from the surface to 600m. The nets were deployed in sets of four frames which were intended to sample depths of 0-25m, 25-50m, 50-75m and 75-100m simultaneously. This was followed immediately by a set of four frames which sampled depths of 100-225m, 225-350m, 350-475m and 475-600m. Thus, eight depths were sampled by these paired nets. One complete series yielded 16 macrozooplankton samples. One such series was done near noon and the other near midnight on each day. We followed this routine from 19 September to 1630 on 24 September. However, it became apparent by then that some of the Bongo frame mechanisms were frequently malfunctioning and several of our nets were torn beyond repair. We ceased sampling for about 36 hours and began a new series using only two frames per cast beginning at 1337 on 26 September.

This new series sampled depths of 0-25m, 25-50m, 50-75m, 75-100m,

100-350m and 350-600m. Thus, sampling at only six depths per series was done for the remainder of the expedition. A further change in the routine was that these new series were done near noon, sunset, midnight and sunrise. This routine was followed until the afternoon of 27 September.

The maximum depth of tow on many early tows of these series was determined by a Benthos depth-telemetering pinger. Since the seas were calm, a relationship between wire angle and tow depth was soon established and on the remaining series, depths were determined from the wire angle.

The flow "control" meters of the 4 Bongo frames (#2, #3, #4, and #6) were calibrated against T.S.K. flow meters in the mouths of the net. Five replicate calibration runs were done on each frame. On the basis of these data the volumes of water filtered by the nets was estimated. Not all of these nets "worked" properly. Table 3 shows the dates, times and depths of sampling as well as the displacement volumes of the catches and comments on the performance of each net and on the reliability of the samples. Figure 3 shows the distribution of macrozooplankton sampling effort with time and depth. All times shown in the Tables are local.

Microzooplankton

The biomass of microzooplankton was estimated from samples taken by means of a pumping system described by Beers, *et al* (1967). In this system, water is pumped from depths to a series of nested "deck" filters aboard ship. These filters were of 363μ, 103μ and 35μ mesh, nylon screen. After filtration these "deck" filters are washed into a container with 840ml of water from the ship's sea water system. An 84ml aliquote from this concentrate is further filtered on tared Millipore filters. These latter filters are then dried and reweighed. The weight gained is a measure of the material present in the original volume of sea water filtered on the nylon mesh "deck" filters. These values, however, must be "corrected" by subtraction of a "blank". The blank is a tared Millipore filter through which an aliquote from an equal volume of wash water (840ml) from the ship's sea water system has been filtered. Thus, the wash water contained microzooplankton and/or detritus from the upper 1 meter (the approximate depth of the intake for the sea water system) and probably detritus from the plumbing of the ship (the RV HORIZON was over 20 years old at the time). In most cases these blanks were equal to or greater than the values of the samples themselves. Therefore in only one case, the 2148-2300 (local time) series on 22 September 1968, was the blank low enough to yield useable sample values. The sampling technique used for this series was as

follows: the pump was raised slowly from 200m at the rate of 5m/min. to 125m. At this time the deck filters were removed and washed. The pumping rate during the ascent was 133 l/min. The same procedure was followed for the depths 125-75m, 75-50m, 50-25m and 25-0m. In both the depth measurements and volume calculations residence time of the water in the overboard pumping system was accounted for.

Photosynthetic Rate

The uptake of radioactive carbon by natural populations was determined by the procedure outlined by Strickland and Parsons (1968; Sec. V.3).

The vertical distribution of light in the water column was measured with a submarine photometer (Austin and Laudermilk, 1968), supplemented with secchi disc measurements to estimate the depth of the 1% light level.

Water samples were collected with Lexan bottles from depths reached by a specific percent of surface radiation. Subsamples of 250ml were innoculated with 20-25μc of C^{14} as bicarbonate. These samples were placed in deck incubators provided with neutral density filters to simulate in situ light intensities at six depths and cooled with surface sea water (Owen and Zeitzschel, 1970). At each intensity there were duplicate light bottles and a dark control. Samples were generally incubated for 6 hours from approximately noon. Samples were subsequently filtered onto Millipore filters, washed, dried, and their radioactivity determined with a Geiger counter. The production values presented in this report are the means of the two replicate determinations and have been corrected for dark "uptake".

Pigments

Chlorophyll-a and phaeophytin were determined from 550ml water samples according to the fluorometric procedure outlined by Strickland and Parsons (1968; Sec. IV. 3). The fluorometer was a Turner model #111, with a red sensitive photomultiplier and a blue lamp (Turner T-5 lamp #110-853). The instrument was calibrated against a spectrophotometer, using near surface populations and correcting the SCOR/UNESCO trichromatic equations for the presence of phaeophytin.

HYDROGRAPHIC DATA

These physical and chemical data were collected in part and processed by the Data Collection and Processing Group (DCPG,

MLR), Scripps Institution of Oceanography, University of California at San Diego.

Five Nansen bottle casts with 18 or fewer bottles were lowered to 1500 meters or less. The Nansen bottles contained paired protected reversing thermometers; unprotected reversing thermometers were included in 12 of the bottles.

Fifteen STD lowerings to 500m and 2 STD lowerings to 100m or less were made.

Water samples from the microzooplankton pumping device were taken for nutrient, chlorophyll-a and phaeo-pigment analyses at 4 "pump" stations.

Water samples for chemical measurements were obtained from the Nansen bottles. Salinity was determined by inductive salinometer. Dissolved oxygen was determined by the Winkler method as revised by J. H. Carpenter (1965). Phosphate, silicate, and nitrate determinations were made with the Technicon Autoanalyzer by methods suggested by Strickland and Parsons (1968).

TABULATED DATA

Data presented in this report were obtained by Nansen bottle casts, by analysis of water samples obtained by a pumping device, and by the _in situ_ Salinity/Temperature/Depth Monitoring and Recording System (STD).[1/] The data appear in three forms:

1. Data from the Nansen bottle casts are tabulated with values at observed depths on the left side of the page and with interpolated and computed values at standard depths on the right.

2. Data from stations with only nutrient and pigment values are tabulated at standard depths and centered on the page.

3. For each STD lowering, temperature and salinity values are read at standard depths only and appear with computed values on the right side of the page. Corrections may have been applied to the temperature or salinity values from continuing comparison of sample bottle data and STD data collected on the same station.

The time listed under "messenger time" for STD lowerings is "start down" time. Fathometer readings were not recorded except for the first hydrographic cast.

[1/] _In situ_ Salinity/Temperature/Depth Monitoring and Recording System, Model 9006, Tech. Rep. No. 102, HYTECH Marine Products, The Bissett-Berman Corporation.

The column headings from the computer are explained as follows:

Z	Depth	meters
T	Temperature	°C
S	Salinity	°/₀₀
O2	Oxygen	ml/L
PO4	Phosphate	µg at/L
SIO3	Silicate	µg at/L
NO3	Nitrate	µg at/L
DT	δT	cl/ton
SIGT	σt	g/L
DD	ΔD	dyn. m
CHLA	Chlorophyll-a	mg/m^3
PHAE	Phaeophytin	mg/m^3

STANDARD PROCEDURES

In situ Salinity/Temperature/Depth Recorder

The manufacturer of the STD claims an accuracy of ±0.05°C with repeatability of ±0.01°C for temperature and an accuracy of ±0.03°/₀₀ with repeatability of ±0.01°/₀₀ for salinity.

The data were digitized at Standard depths from the analog recording. Temperature data from the STD lowerings and Nansen bottle temperature data agreed closely so that no correction to the STD temperature data was necessary. No correction to the STD salinity data shallower than 150m was necessary. At depths greater than 150m a correction of 0.04°/₀₀ was applied to the STD salinity data.

Hydrographic Casts

The observed data have been plotted and then evaluated using the method described by Klein.[1/] This involves consideration of their variation as functions of density or depth and their relations to each other, and comparison with previous or adjacent observations.

To indicate degree of accuracy, temperature is recorded in hundredths of a degree. Salinity, when determined by salinometer, is recorded to three decimal places, provided it meets accepted standards. The values are recorded to two decimal places when only one determination per sample was obtained, or where there is doubt

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[1/] Klein, Hans T. A new technique for processing physical oceanographic data. SIO Ref. 73-14.

concerning the accuracy of a particular sample, or of all samples on a station. Due to inexperienced personnel operating the salinometer during this leg of the cruise only the values for Cast 6 were considered to have the usual accuracy.

FOOTNOTES

In addition to footnotes, one special notation is used without a footnote because the meaning is always the same. Values which seem to be in error without apparent reason are indicated by the following notation:

u: uncertain value

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FIGURES

TABLES

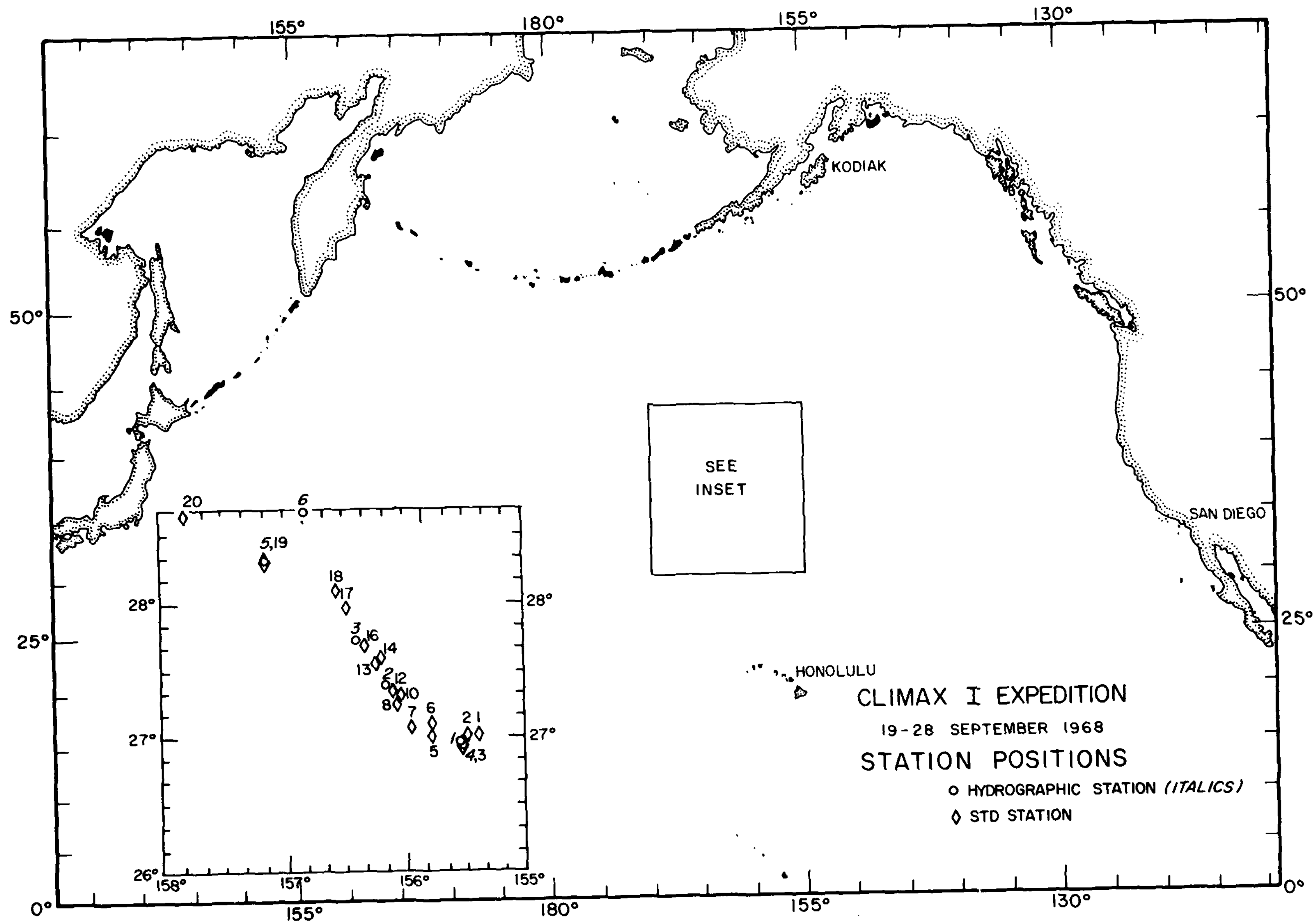

155°
180°
155°
130°
50°
25°
0°
KODIAK
SAN DIEGO
HONOLULU
SEE
INSET
CLIMAX I EXPEDITION
19-28 SEPTEMBER 1968
STATION POSITIONS
o HYDROGRAPHIC STATION (ITALICS)
◊ STD STATION
158°
157°
156°
155°
28°
27°
26°

FIGURE I

PERSONNEL

SHIP'S CAPTAIN

Ferris, Noel, RV _Argo_

PERSONNEL PARTICIPATING IN THE COLLECTION OF DATA

RV Argo

McGowan, J. A., Chief Scientist, Assoc. Prof. S.I.O.
Barnett, A., 2nd year Graduate Student
Clutter, R. I., Assoc. Prof., Univ. of Hawaii
Gopalakrishnan, K., 1st year Graduate Student
Haury, L., 1st year Graduate Student
Hurley, A., 1st year Graduate Student
Judkins, D., 2nd year Graduate Student
Kamykowski, D., 1st year Graduate Student
Klapow, L., 2nd year Graduate Student
Mauck, W., Marine Technician
Renz, G., 1st year Graduate Student
Rosendahl, R., Marine Technician
Smith, G., 1st year Graduate Student
Venrick, E., Post Grad. Res. Oceanog. S.I.O.
Wormuth, J., 2nd year Graduate Student
Yoshioka, P., 1st year Graduate Student

HYDROGRAPHIC DATA

RV ARGO — CLIMAX I EXPEDITION — STD 1

LATITUDE	LONGITUDE	MO/DAY/YR	MESSENGER TIME		BOTTOM	WIND	SPEED	WEATHER	DOMINANT WAVES
26 58.0N	155 24.0W	09/19/68	2330	GMT		090	15KT	1	030 04

Z	T	S	O2	PO4	SIO3	NO2	NO3	DT	Z	T	S	O2	SIGT	DT	DD
									0	26.93	34.96		22.731	513.1	0
									10	26.82	34.98		22.781	508.3	.051
									20	26.82	35.07		22.849	501.8	.102
									30	26.57	35.09		22.943	492.8	.151
									50	23.73	35.13		23.840	407.2	.242
									75	21.50	35.14		24.483	345.9	.337
									100	20.49	35.07		24.704	324.8	.421
									125	19.39	35.02		24.955	300.9	.500
									150	18.38	34.91		25.128	284.5	.575
									200	16.33	34.73		25.483	250.7	.711
									250	14.04	34.44		25.765	223.9	.833
									300	12.26	34.28		26.000	201.6	.943
									400	9.61	34.11		26.343	169.0	1.136
									500	7.39	34.02		26.614	143.3	1.300

RV ARGO — CLIMAX I EXPEDITION — PUMP 1

LATITUDE	LONGITUDE	MO/DAY/YR	MESSENGER TIME		BOTTOM	WIND	SPEED	WEATHER	DOMINANT WAVES
26 59.0N	155 31.5W	09/20/68	0315	GMT		100	17KT	1	100 03

Z	PO4	SIO3	NO2	NO3	NH4	CHLA	PHAE
0A	.10	5.					
10	.04	5.					
25	.04	6.					
35	.06	5.					
50	.06	5.					
60	.06	6.					
75	.06	5.					
100	.08	5.					
125	.10	6.					
150	.26	9.					
200	.34	11.					

RV ARGO — CLIMAX I EXPEDITION — STD 2

LATITUDE	LONGITUDE	MO/DAY/YR	MESSENGER TIME		BOTTOM	WIND	SPEED	WEATHER	DOMINANT WAVES
26 59.0N	155 31.5W	09/20/68	0510	GMT		100	14KT	1	110 04

Z	T	S	O2	PO4	SIO3	NO2	NO3	DT	Z	T	S	O2	SIGT	DT	DD
									0	26.94	34.98		22.743	511.9	0
									10	26.98	35.09		22.813	505.3	.051
									20	26.64	35.10		22.929	494.2	.101
									30	26.00	35.17		23.183	470.0	.149
									50	23.18	35.11		23.985	393.4	.236
									75	21.58	35.11		24.438	350.2	.329
									100	20.60	35.11		24.705	324.8	.415
									125	19.43	35.04		24.960	300.5	.494
									150	18.31	34.94		25.168	280.7	.568
									200	15.94	34.64		25.503	248.8	[illegible]
									250	13.43	34.41		25.868	214.1	.822
									300	12.04	34.28		26.042	197.6	.928
									400	9.51	34.14		26.383	165.2	1.117
									500	7.22	34.02		26.638	141.0	1.278

RV ARGO — CLIMAX I EXPEDITION — CAST 1

LATITUDE	LONGITUDE	MO/DAY/YR	MESSENGER TIME		BOTTOM	WIND	SPEED	WEATHER	DOMINANT WAVES
26 56.0N	155 36.0W	09/20/68	1945	GMT	5661M	120	04KT	1	080 06

Z	T	S	O2	PO4	SIO3	NO2	NO3	DT	Z	T	S	O2	SIGT	DT	DD
2		34.99	4.55	.64	5.		.3		0			4.55			
11		34.99	4.71	.12	4.		.5		10			4.70			
22		35.04	4.77	.34	4.		.3		20			4.77			
33		35.07	4.90U	.08	4.		.2		30			4.63			
51		35.11	5.31U	.19	5.		.3		50			4.38			
76		35.12	4.25	.08	5.		.3		75			4.25			
100	20.15	35.10	5.07	.08	6.		.8	314.1	100	20.15	35.10	5.07	24.817	314.1	
125	19.12	35.04	4.83	.22	8.		1.9	292.9	125	19.12	35.04	4.83	25.040	292.9	
150	18.05	34.94	4.60U	.27	10.		2.8	274.6	150	18.05	34.94	4.76	25.232	274.6	
199	16.26	34.69	4.61	.27	12.		4.1	252.1	200	16.22	34.69	4.62	25.474	251.6	
247	14.40	34.51	4.89	.56	16.		6.6	226.0	250	14.28	34.50	4.89	25.758	224.5	
296	12.59	34.33	4.81	.89	21.		9.4	204.0	300	12.47	34.32	4.81	25.990	202.5	
395	10.08	34.16	4.71	1.40	31.		14.3	172.8	400	9.95	34.15	4.66	26.319	171.3	
492	7.62	34.03	3.61	2.85	48.			145.7	500	7.44	34.03	3.57	26.611	143.5	
590	5.81	34.04	3.20					121.8	600	5.70	34.05	3.13	26.860	119.9	
788	4.59	34.26		3.02	85.			91.8	700	4.90	34.15	2.42	27.039	103.0	
987	3.91	34.42	.62		91.			72.9	800	4.54	34.27	1.76	27.172	90.4	
1481	2.80	34.56	1.30U	3.47	102.			52.3	1000	3.87	34.43	.64	27.367	71.9	
									1200	3.28	34.52	.90	27.497	59.5	
									1500	2.79	34.56	1.30	27.575	52.2	

A) THESE PHOSPHATE AND SILICATE SAMPLES WERE DRAWN FROM MICROZOOPLANKTON PUMP WATER.

RV ARGO CLIMAX I EXPEDITION STD 3

LATITUDE	LONGITUDE	MO/DAY/YR	MESSENGER TIME		BOTTOM	WIND	SPEED	WEATHER	DOMINANT WAVES
26 55.5N	155 36.0W	09/20/68	2105	GMT		150	05KT	1	080 05

Z	T	S	O2	PO4	SIO3	NO2	NO3	DT	Z	T	S	O2	SIGT	DT	DD
									0	26.82	35.01		22.804	506.1	0
									10	26.76	35.01		22.823	504.3	.051
									20	26.76	35.04		22.846	502.2	.101
									30	26.77	35.09		22.880	498.9	.151
									50	24.12	35.10		23.702	420.4	.243
									75	21.64	35.09		24.406	353.2	.341
									100	20.19	35.05		24.769	318.7	.425
									125	19.19	35.02		25.007	296.0	.503
									150	17.96	34.90		25.224	275.4	.576
									200	16.08	34.60		25.441	254.8	.711
									250	14.09	34.44		25.755	224.9	.834
									300	12.34	34.30		26.000	201.6	.945
									400	9.87	34.14		26.323	170.9	1.139
									500	7.42	34.03		26.618	142.9	1.304

RV ARGO CLIMAX I EXPEDITION STD 4

LATITUDE	LONGITUDE	MO/DAY/YR	MESSENGER TIME		BOTTOM	WIND	SPEED	WEATHER	DOMINANT WAVES
26 55.5N	155 36.0W	09/21/68	0700	GMT		110	12KT	1	080 04

Z	T	S	O2	PO4	SIO3	NO2	NO3	DT	Z	T	S	O2	SIGT	DT	DD
									0	26.85	35.04		22.817	504.9	0
									10	26.80	35.05		22.840	502.7	.050
									20	26.80	35.09		22.871	499.8	.101
									30	26.76	35.10		22.891	497.8	.151
									50	23.88	35.11		23.781	412.9	.242
									75	21.70	35.11		24.405	353.4	.338
									100	20.57	35.13		24.728	322.5	.424
									125	19.81	35.09		24.899	306.3	.503
									150	18.72	34.96		25.080	289.0	.579
									200	16.18	34.65		25.456	253.3	.717
									250	13.65	34.36		25.785	222.1	.839
									300	12.27	34.28		25.998	201.8	.949
									400	9.68	34.13		26.347	168.6	1.142
									500	7.77	34.04		26.575	147.0	1.308

RV ARGO CLIMAX I EXPEDITION STD 5

LATITUDE	LONGITUDE	MO/DAY/YR	MESSENGER TIME		BOTTOM	WIND	SPEED	WEATHER	DOMINANT WAVES
27 00.0N	155 50.0W	09/21/68	1803	GMT		120	12KT	1	110 03

Z	T	S	O2	PO4	SIO3	NO2	NO3	DT	Z	T	S	O2	SIGT	DT	DD
									0	26.80	35.02		22.818	504.8	0
									10	26.80	35.02		22.818	504.8	.051
									20	26.85	35.10		22.862	500.6	.101
									30	26.83	35.10		22.869	500.0	.151
									50	24.70	35.06		23.498	439.8	.245
									75	21.73	35.08		24.374	356.3	.345
									100	20.53	35.10		24.716	323.7	.431
									125	19.27	35.01		24.978	298.7	.510
									150	17.91	34.90		25.236	274.2	.583
									200	16.15	34.70		25.501	249.0	.716
									250	13.88	34.44		25.799	220.7	.837
									300	12.51	34.36		26.013	200.3	.946
									400	9.57	34.12		26.357	167.6	1.138
									500	7.57	34.01		26.581	146.5	1.303

RV ARGO CLIMAX I EXPEDITION STD 6

LATITUDE	LONGITUDE	MO/DAY/YR	MESSENGER TIME		BOTTOM	WIND	SPEED	WEATHER	DOMINANT WAVES
27 05.3N	155 50.0W	09/22/68	0652	GMT		150	06KT	1	120 03

Z	T	S	O2	PO4	SIO3	NO2	NO3	DT	Z	T	S	O2	SIGT	DT	DD
									0	27.35	34.97		22.604	525.2	0
									10	26.96	35.00		22.752	511.1	.052
									20	26.89	35.05		22.812	505.4	.103
									30	26.92	35.09		22.832	503.4	.153
									50	25.65	35.21		23.321	456.7	.250
									75	22.17	35.17		24.319	361.5	.352
									100	20.59	35.09		24.693	325.9	.439
									125	19.50	35.04		24.942	302.2	.519
									150	18.27	34.94		25.178	279.7	.593
									200	16.37	34.73		25.473	251.6	.728
									250	13.72	34.46		25.847	216.1	.849
									300	11.98	34.26		26.038	198.0	.956
									400	9.55	34.12		26.361	167.3	1.146
									500	7.43	34.03		26.616	143.1	1.309

RV ARGO CLIMAX I EXPEDITION PUMP 2

LATITUDE	LONGITUDE	MO/DAY/YR	MESSENGER TIME	BOTTOM	WIND	SPEED	WEATHER	DOMINANT WAVES
27 05.5N	155 50.0W	09/22/68	0723 GMT		150	05KT	1	02

Z	PO4	SIO3	NO2	NO3	NH4	CHLA	PHAE
0A	.05	5.				.03	.01
10	.05	6.				.02	.03
25	.05	5.				.02	.01
35	.05	5.				.03	.02
50	.06	7.				.04	.02
60	.07	5.				.05	.03
75	.03	6.				.07	.03
100	.06	8.				.12	.16
125	.23	11.				.12	.17
150	.16	8.				.04	.07
200	.33	13.				.01	.02

RV ARGO CLIMAX I EXPEDITION STD 7

LATITUDE	LONGITUDE	MO/DAY/YR	MESSENGER TIME	BOTTOM	WINU	SPEED	WEATHER	DOMINANT WAVES
27 03.7N	155 56.8W	09/22/68	2157 GMT		120	04KT	1	080 03

Z	T	S	O2	PO4	SIO3	NC2	NO3	CT	Z	T	S	O2	SIGT	DT	DD
									0	27.18	35.03		22.704	515.7	0
									10	26.92	35.04		22.795	507.0	.051
									20	26.93	35.07		22.814	505.2	.102
									30	26.92	35.08		22.825	504.1	.152
									50	25.75	35.07		23.185	469.7	.250
									75	21.88	35.12		24.362	357.4	.354
									100	20.44	35.13		24.763	319.2	.439
									125	19.23	35.03		25.004	296.3	.517
									150	18.20	34.94		25.195	278.1	.590
									200	16.38	34.70		25.448	254.0	.726
									250	14.15	34.46		25.757	224.6	.849
									300	12.38	34.33		26.015	200.1	.959
									400	9.71	34.12		26.334	169.9	1.152
									500	7.50	34.02		26.598	144.8	1.317

RV ARGO CLIMAX I EXPEDITION STD 8

LATITUDE	LONGITUDE	MO/DAY/YR	MESSENGER TIME	BOTTOM	WIND	SPEED	WEATHER	DOMINANT WAVES
27 12.0N	156 05.0W	09/23/68	0610 GMT		130	10KT	1	100 02

Z	T	S	O2	PO4	SIO3	NC2	NC3	DT	Z	T	S	O2	SIGT	DT	DD
									0	27.49	35.00		22.582	527.4	0
									10	26.96	35.03		22.774	509.0	.052
									20	26.94	35.03		22.781	508.4	.103
									30	26.92	35.06		22.810	505.6	.154
									50	26.15	35.07		23.060	481.6	.253
									75	22.64	35.07		24.110	381.4	.361
									100	20.80	35.10		24.644	330.6	.451
									125	19.60	35.04		24.916	304.7	.531
									150	18.57	34.94		25.103	286.9	.606
									200	16.25	34.69		25.471	251.9	.744
									250	13.78	34.35		25.750	225.3	.867
									300	12.12	34.28		26.027	199.0	.976
									400	9.47	34.10		26.358	167.6	1.167
									500	7.52	34.02		26.596	145.0	1.331

RV ARGO CLIMAX I EXPEDITION PUMP 3

LATITUDE	LONGITUDE	MO/DAY/YR	MESSENGER TIME	BOTTOM	WIND	SPEED	WEATHER	DOMINANT WAVES
27 12.5N	156 04.5W	09/23/68	0951 GMT		090	06KT	1	080 03

Z	PO4	SIO3	NO2	NO3	NH4	CHLA	PHAE
0A	.11	4.				.05	.02
10	.09	4.				.02	.02
25	.09	4.				.02	.02
35	.09	4.				.06	.07
50	.07	5.					
60	.05	5.					
75	.07	6.				.06	.04
100	.12	6.				.14	.27
110	.14	7.				.18	.21
125	.16	7.				.11	.21
150	.28	10.				.02	.05
200	.31	13.				.01	.02

A) THESE CHLOROPHYLL A AND PHAEOPHYTIN SAMPLES WERE DRAWN FROM MICROZOOPLANKTON PUMP WATER.

RV ARGO — CLIMAX I EXPEDITION — STD10

LATITUDE	LONGITUDE	MO/DAY/YR	MESSENGER TIME		BOTTOM	WIND	SPEED	WEATHER	DOMINANT WAVES
27 14.0N	156 03.0W	09/23/68	1125	GMT		090	08KT	1	

Z	T	S	O2	PO4	SIO3	NO2	NO3	DT	Z	T	S	O2	SIGT	DT	DD
									0	27.08	34.77		22.541	531.3	0
									10	26.97	34.90		22.673	518.6	.053
									20	26.96	34.99		22.744	511.8	.104
									30	26.86	35.00		22.784	508.1	.155
									50	23.60	35.10		23.855	405.7	.247
									75	21.53	35.08		24.429	351.0	.342
									100	20.18	35.04		24.764	319.2	.427
									125	19.41	34.99		24.927	303.6	.505
									150	18.34	34.86		25.099	287.2	.581
									200	16.28	34.65		25.433	255.5	.719
									250	13.75	34.38		25.779	222.6	.842
									300	11.94	34.23		26.022	199.5	.951
									400	9.80	34.09		26.296	173.5	1.145
									500	7.43	33.97		26.569	147.5	1.314

RV ARGO — CLIMAX I EXPEDITION — STD12

LATITUDE	LONGITUDE	MO/DAY/YR	MESSENGER TIME		BOTTOM	WIND	SPEED	WEATHER	DOMINANT WAVES
27 20.0N	156 08.0W	09/23/68	1900	GMT		080	07KT	1	030 05

Z	T	S	O2	PO4	SIO3	NO2	NO3	DT	Z	T	S	O2	SIGT	DT	DD
									0	27.01	35.02		22.751	511.2	0
									10	26.97	35.01		22.756	510.7	.051
									20	26.94	35.03		22.781	508.4	.102
									30	26.94	35.04		22.788	507.6	.153
									50	25.13	35.10		23.398	449.4	.249
									75	21.69	35.06		24.370	356.7	.350
									100	20.43	35.07		24.720	323.3	.436
									125	19.15	34.98		24.986	298.0	.515
									150	18.39	34.92		25.133	284.0	.589
									200	16.18	34.61		25.425	256.2	.727
									250	13.58	34.36		25.799	220.7	.849
									300	12.16	34.26		26.004	201.2	.958
									400	9.65	34.08		26.313	171.9	1.152
									500	7.39	33.97		26.575	147.0	1.320

RV ARGO — CLIMAX I EXPEDITION — CAST 2

LATITUDE	LONGITUDE	MO/DAY/YR	MESSENGER TIME		BOTTOM	WIND	SPEED	WEATHER	DOMINANT WAVES
27 21.5N	156 11.0W	09/23/68	2013	GMT		060	04KT	1	310 04 08

Z	T	S	O2	PO4	SIO3	NO2	NO3	DT	Z	T	S	O2	SIGT	DT	DD
0	26.97	35.02		.08	3.		0.1	510.0	0	26.97	35.02		22.764	510.0	0
20	26.78	35.04		.11	3.		0.1	502.8	10	26.88	35.03		22.802	506.4	.051
30		35.07	4.47	.05	3.		0.1		20	26.78	35.04		22.839	502.8	.101
49	24.30	35.17	5.26	.11	4.		0.1	420.4	30	26.10	35.07	4.47	23.088	479.0	.151
74	21.72	35.13	4.97	.14	4.		0.1	352.4	50	24.19	35.17	5.26	23.734	417.3	.240
98	20.70	35.15	5.03	.07	5.		0.1	324.4	75	21.67	35.13	4.97	24.430	350.9	.337
123	19.20		4.59	.26	7.		2.1		100	20.57	35.14	5.00	24.738	321.7	.422
148	18.40	34.99	4.51	.28	8.		2.8	279.2	125	19.12	35.06	4.58	25.055	291.4	.500
197	16.74	34.77	4.50	.41	11.		4.3	256.9	150	18.33	34.98	4.51	25.194	278.2	.572

RV ARGO — CLIMAX I EXPEDITION — STD13

LATITUDE	LONGITUDE	MO/DAY/YR	MESSENGER TIME		BOTTOM	WIND	SPEED	WEATHER	DOMINANT WAVES
27 31.0N	156 17.0W	09/24/68	0556	GMT		100	10KT	1	350 04

Z	T	S	O2	PO4	SIO3	NO2	NO3	DT	Z	T	S	O2	SIGT	DT	DD
									0	27.27	34.94		22.607	524.9	0
									10	27.02	35.03		22.755	510.8	.052
									20	26.97	35.06		22.794	507.1	.103
									30	26.96	35.06		22.797	506.8	.154
									50	25.00	35.13		23.460	443.4	.249
									75	21.81	35.07		24.344	359.2	.350
									100	20.56	35.11		24.716	323.7	.436
									125	19.39	35.02		24.955	300.9	.515
									150	18.18	34.90		25.170	280.5	.589
									200	15.94	34.51		25.480	251.0	.725
									250	13.70	34.42		25.820	218.6	.845
									300	12.02	34.26		26.030	198.7	.953
									400	9.50	34.08		26.338	169.5	1.145
									500	7.24	33.98		26.604	144.2	1.310

RV ARGO — CLIMAX I EXPECITION — STD14

LATITUDE	LONGITUDE	MO/DAY/YR	MESSENGER TIME		BOTTOM	WIND	SPEED	WEATHER	DOMINANT WAVES
27 33.0N	156 14.0W	09/24/68	1650	GMT		030	06KT	6	360 06

Z	T	S	O2	PO4	SIO3	NO2	NC3	DT	Z	T	S	O2	SIGT	DT	DD
									0	27.18	35.06		22.727	513.5	0
									10	27.04	35.08		22.787	507.8	.051
									20	26.97	35.08		22.809	505.7	.102
									30	26.96	35.10		22.827	503.9	.152
									50	26.25	35.10		23.052	482.5	.251
									75	21.73	35.10		24.389	354.9	.357
									100	20.56	35.12		24.723	323.0	.442
									125	19.55	35.06		24.944	302.0	.521
									150	18.38	34.97		25.173	280.2	.595
									200	16.10	34.67		25.490	250.1	.731
									250	13.83	34.47		25.832	217.5	.851
									300	12.34	34.31		26.008	200.9	.959
									400	9.88	34.16		26.337	169.6	1.152
									500	7.39	34.04		26.630	141.8	1.316

RV ARGO — CLIMAX I EXPEDITION — STD16

LATITUDE	LONGITUDE	MO/DAY/YR	MESSENGER TIME		BOTTOM	WIND	SPEED	WEATHER	DOMINANT WAVES
27 40.0N	156 21.0W	09/24/68	2323	GMT		090	08KT	1	350 06

Z	T	S	O2	PO4	SIO3	NC2	NO3	DT	Z	T	S	O2	SIGT	DT	DD
									0	27.32	34.87		22.539	531.5	0
									10	27.08	35.07		22.766	509.8	.052
									20	26.99	35.09		22.810	505.6	.103
									30	26.97	35.11		22.831	503.5	.153
									50	25.07	35.12		23.432	446.2	.249
									75	22.01	35.13		24.334	360.1	.350
									100	20.88	35.12		24.637	331.2	.437
									125	19.78	35.10		24.915	304.8	.518
									150	18.58	35.00		25.146	282.7	.593
									200	16.30	34.68		25.451	253.7	.729
									250	13.58	34.46		25.876	213.4	.849
									300	11.92	34.32		26.096	192.5	.954
									400	9.32	34.12		26.398	163.8	1.140
									500	7.51	34.06		26.628	141.9	1.301

RV ARGO — CLIMAX I EXPEDITION — CAST 3

LATITUDE	LONGITUDE	MO/DAY/YR	MESSENGER TIME		BOTTOM	WIND	SPEED	WEATHER	DOMINANT WAVES
27 41.0N	156 25.5W	09/25/68	0708	GMT		070	09KT	2	360 06

Z	T	S	O2	PO4	SIO3	NO2	NC3	DT	Z	T	S	O2	SIGT	DT	DD
1	27.01	34.54	4.80U	.22	4.		.3	545.7	0	27.01	34.54		22.390	545.7	0
11	26.96	34.98	4.79	.17	4.		.2	512.6	10	26.97	34.95		22.714	514.7	.053
21	26.89	35.05	4.42	.19	4.		.3	505.4	20	26.90	35.05	4.42	22.809	505.6	.104
31		35.06	4.77	.17	4.		.2		30	26.72	35.07	4.72	22.882	498.6	.154
50	25.49	35.08	5.33		4.		.3	461.3	50	25.49	35.08	5.33	23.273	461.3	.251
75	21.69	35.19	5.13	.31	5.		.3	347.3	75	21.69	35.19	5.13	24.468	347.3	.352
99	20.47	35.10	5.07		6.		.4	322.2	100	20.42	35.10	5.06	24.745	320.9	.437
124	19.38	35.12	4.76	.29	7.		1.0	293.4	125	19.34	35.12	4.76	25.043	292.6	.514
149	18.40	35.06	4.67	.29	9.		3.1	274.1	150	18.36	35.06	4.67	25.246	273.3	.586
198	16.50	34.97	4.95	.48	11.		3.1	237.0	200	16.43	34.96	4.95	25.638	236.0	.717
246	14.64	34.73	5.00	.51	15.		5.3	214.8	250	14.46	34.71	4.99	25.885	212.5	.832
295	12.45	34.52	4.83	.68	20.		9.9	187.4	300	12.28	34.51	4.83	26.171	185.3	.935
394	9.67	34.30	4.75	1.22	32.		16.8	155.9	400	9.52	34.29	4.71	26.496	154.5	1.113
492	7.47	34.12	3.71	2.02	49.		23.5	136.9	500	7.31	34.11	3.56	26.696	135.5	1.266
589	5.79	34.04	1.89	2.96	66.		29.2	121.6	600	5.68	34.04	1.76	26.855	120.4	1.401
787	4.62	34.06	.64	3.30	83.		31.2	107.1	700	4.92	34.04	.90	26.947	111.7	1.525
984	3.95	34.07	.79	4.03U	91.		31.4	99.6	800	4.57	34.06	.65	27.002	106.5	1.642
1473	2.84	34.04	1.58	3.43	102.		32.0	91.9	1000	3.90	34.07	.82	27.079	99.2	1.863
									1200	3.30	34.05	1.17	27.122	95.1	2.074
									1500	2.83	34.04	1.59	27.157	91.8	2.380

RV ARGO — CLIMAX I EXPEDITION — STO17

LATITUDE	LONGITUDE	MO/DAY/YR	MESSENGER TIME		BOTTOM	WIND	SPEED	WEATHER	DOMINANT WAVES
27 56.0N	156 30.5W	09/25/68	1637	GMT		060	12KT		360 05

Z	T	S	O2	PO4	SIO3	NO2	NO3	DT	Z	T	S	O2	SIGT	DT	DD
									0	26.98	34.84		22.625	523.2	0
									10	26.98	34.84		22.625	523.2	.052
									20	27.03	34.95		22.692	516.9	.104
									30	27.01	35.10		22.811	505.5	.156
									50	25.30	35.14		23.376	451.5	.252
									75	22.25	35.10		24.243	368.7	.355
									100	20.75	35.16		24.703	325.0	.442
									125	19.52	35.10		24.982	298.3	.521
									150	18.38	35.00		25.196	278.0	.594
									200	16.19	34.72		25.507	248.4	.729
									250	13.80	34.47		25.838	216.9	.848
									300	12.12	34.33		26.065	195.4	.955
									400	9.73	34.18		26.378	165.7	1.143
									500	7.48	34.06		26.633	141.5	1.305

RV ARGO — CLIMAX I EXPEDITION — STO18

LATITUDE	LONGITUDE	MO/DAY/YR	MESSENGER TIME		BOTTOM	WIND	SPEED	WEATHER	DOMINANT WAVES
28 05.0N	156 36.0W	09/26/68	0458	GMT		060	09KT	1	010 05

Z	T	S	O2	PO4	SIO3	NO2	NO3	DT	Z	T	S	O2	SIGT	DT	DD
									0	27.17	34.78		22.519	533.4	0
									10	27.10	34.78		22.542	531.2	.053
									20	27.05	34.91		22.655	520.3	.106
									30	27.02	35.00		22.733	513.0	.158
									50	26.72	35.04		22.858	500.9	.259
									75	21.87	35.05		24.312	362.2	.368
									100	20.60	35.09		24.690	326.2	.455
									125	19.55	35.02		24.914	304.9	.535
									150	18.40	34.92		25.130	284.3	.609
									200	16.27	34.66		25.443	254.5	.747
									250	14.35	34.46		25.715	228.7	.871
									300	12.45	34.26		25.948	206.6	.983
									400	9.72	34.12		26.332	170.0	1.180
									500	7.53	34.00		26.578	146.7	1.346

RV ARGO — CLIMAX II EXPEDITION — CAST 4

LATITUDE	LONGITUDE	MO/DAY/YR	MESSENGER TIME		BOTTOM	WIND	SPEED	WEATHER	DOMINANT WAVES
28 05.0N	156 36.0W	09/26/68	0545	GMT		050	12KT	1	110

Z	PO4	SIO3	NO2	NO3	NH4	CHLA	PHAE
0	.09	4.		.1			
20	.10	5.		.1		.03	.01
40	.10	4.		.1		.03	.01
60	.10	5.		.0		.04	.02
80	.12	5.		.0		.05	.05
90	.14	7.		.0		.05	.10
100	.17	7.		.3		.14	.18
110	.22	7.		1.0		.14	.20
120	.24	8.		2.0		.10	.14
140	.29	9.		2.9			
160	.31	10.		3.1		.02	.02
180	.36	10.		3.3		.01	.02
200	.32	11.		2.9		.01	.02
230	.39	14.		4.5		.01	.01
260	.63	18.		7.7		.00	.01
290	.73	20.		9.1		.00	.01
320	.92	24.		11.2		.00	.01
350	1.07	27.		13.3		.00	.00

RV ARGO — CLIMAX I EXPEDITION — STD19

LATITUDE	LONGITUDE	MO/DAY/YR	MESSENGER TIME		BOTTOM	WIND	SPEED	WEATHER	DOMINANT WAVES
28 17.0N	157 12.0W	09/26/68	1802	GMT		060	12KT	1	040 04

Z	T	S	O2	PO4	SIO3	NO2	NO3	DT	Z	T	S	O2	SIGT	DT	DD
									0	27.01	34.79		22.578	527.7	0
									10	27.01	34.79		22.578	527.7	.053
									20	27.04	34.91		22.659	520.0	.105
									30	26.88	35.01		22.785	508.0	.157
									50	24.60	35.06		23.528	436.9	.252
									75	21.58	35.05		24.392	354.5	.351
									100	20.54	35.06		24.683	326.8	.437
									125	19.37	35.00		24.945	301.9	.517
									150	18.35	34.88		25.112	286.0	.591
									200	16.53	34.70		25.413	257.3	.730
									250	14.24	34.41		25.700	230.1	.855
									300	12.00	34.22		26.003	201.3	.967
									400	9.69	34.10		26.322	171.0	1.160
									500	7.18	33.97		26.604	144.2	1.326

RV ARGO — CLIMAX I EXPEDITION — CAST 5

LATITUDE	LONGITUDE	MO/DAY/YR	MESSENGER TIME		BOTTOM	WIND	SPEED	WEATHER	DOMINANT WAVES
28 17.0N	157 12.0W	09/26/68	2057	GMT		060	04KT	2	050 05 08

Z	T	S	O2	PO4	SIO3	NO2	NO3	DT	Z	T	S	O2	SIGT	DT	DD
1	27.02	34.85						523.7	0	27.02	34.85		22.620	523.7	0
11	26.93	34.84						521.7	10	26.94	34.84		22.639	521.9	.052
21	27.04	35.02						512.1	20	27.03	34.99		22.726	513.6	.104
31		35.07							30	26.11	35.07		23.076	480.2	.154
50	23.18	35.10						394.1	50	23.18	35.10		23.978	394.1	.242
75	20.87	35.14						329.5	75	20.87	35.14		24.655	329.5	.333
98	19.80	35.08						306.7	100	19.71	35.07		24.915	304.7	.413
123	18.69	35.01						284.7	125	18.62	35.00		25.139	283.4	.487
148	17.86	34.92						271.6	150	17.78	34.91		25.275	270.5	.558
197	15.84	34.65						245.9	200	15.70	34.63		25.552	244.1	.689
246	13.59	34.41						217.2	250	13.42	34.39		25.858	215.1	.807
294	11.76	34.26						194.0	300	11.61	34.25		26.102	191.9	.912
393	9.78	34.18						166.5	400	9.62	34.17		26.386	164.9	1.098
491	7.66	34.04						145.5	500	7.48	34.04		26.614	143.3	1.260
589	5.94	34.05						122.6	600	5.81	34.06		26.854	120.5	1.400
787	4.50	34.24						92.4	700	4.92	34.15		27.032	103.6	1.520
985	3.85	34.40						73.8	800	4.44	34.25		27.167	90.9	1.625
1478	2.82	34.55						53.2	1000	3.80	34.40		27.351	73.4	1.805
									1200	3.25	34.43		27.425	66.4	1.962
									1500	2.81	34.58		27.589	50.9	2.165

RV ARGO — CLIMAX I EXPEDITION — STD20

LATITUDE	LONGITUDE	MO/DAY/YR	MESSENGER TIME		BOTTOM	WIND	SPEED	WEATHER	DOMINANT WAVES
28 36.0N	157 52.0W	09/28/68	0024	GMT		070	05KT	1	030 04

Z	T	S	O2	PO4	SIO3	NO2	NO3	DT	Z	T	S	O2	SIGT	DT	DD
									0	27.33	34.83		22.505	534.7	0
									10	27.02	34.84		22.612	524.5	.053
									20	27.00	34.85		22.626	523.1	.105
									30	27.09	35.03		22.733	512.9	.157
									50	25.25	35.10		23.362	452.9	.254
									75	21.35	35.05		24.456	348.5	.355
									100	20.04	35.04		24.801	315.6	.439
									125	18.79	34.96		25.063	290.7	.516
									150	17.93	34.87		25.208	276.8	.588
									200	16.03	34.65		25.490	250.0	.722
									250	13.57	34.36		25.801	220.5	.843
									300	11.73	34.18		26.023	199.4	.951
									400	9.34	34.03		26.325	170.7	1.144
									500	7.56	33.98		26.558	148.6	1.312

RV ARGO — CLIMAX I EXPEDITION — CAST 6

LATITUDE	LONGITUDE	MO/DAY/YR	MESSENGER TIME		BOTTOM	WIND	SPEED	WEATHER	DOMINANT WAVES
28 39.0N	156 52.0W	09/28/68	0457	GMT		070	06KT	1	030 04

Z	T	S	O2	PO4	SIO3	NO2	NO3	DT	Z	T	S	O2	SIGT	DT	DD
1	27.14	34.907	4.83	.10	4.		.3	523.3	0	27.14	34.907	4.83	22.624	523.3	0
10	26.98	35.002	4.75	.10	5.		.1	511.6	10	26.98	35.002	4.75	22.747	511.6	.052
19	26.92	35.007	4.71	.10	5.		.1	509.4	20	26.84	35.012	4.76	22.798	506.7	.103
28		35.077	5.25	.17	5.		.2		30	25.92	35.068	5.33	23.131	474.9	.152
46	23.78	35.187	5.66	.12	6.		.1	404.5	50	23.23	35.206	5.64	24.043	387.8	.239
70	20.84	35.253	5.33	.17	6.		.1	320.6	75	20.53	35.226	5.29	24.813	314.5	.327
92	19.72	35.096	5.13	.18	7.		.1	303.6	100	19.22	35.051	4.95	25.024	294.4	.404
115	18.35	34.985	4.67	.22	9.		.9	278.4	125	18.02	34.950	4.71	25.248	273.1	.476
139	17.66	34.906	4.76	.22	11.		1.5	267.9	150	17.36	34.881	4.90	25.356	262.8	.544
184	16.25	34.768	5.20	.18	12.		0.7	246.2	200	15.47	34.647	5.01	25.615	238.2	.672
228	14.05	34.446	4.61	.45	18.		4.7	223.7	250	13.16	34.380	4.61	25.899	211.2	.787
273	12.36	34.341	4.62	.65	23.		6.7	198.9	300	11.64	34.283	4.69	26.120	190.1	.891
361	10.21	34.159	4.84	1.05	32.		11.7	175.0	400	9.09	34.096	4.40	26.416	162.1	1.074
434	8.18	34.058	3.93	1.68	46.		17.2	151.4	500	7.06	34.029	3.27	26.666	138.3	1.232
530	6.69	34.027	2.99	2.48	60.		21.4	133.6	600	5.85	34.064	2.13	26.854	120.5	1.369
725	4.77	34.181	.87	3.42	86.		25.1	99.6	700	4.94	34.154	1.10	27.033	103.5	1.489
921	4.03	34.365	.68	3.76U	97.		26.1	78.2	800	4.35	34.252	.80	27.177	89.9	1.593

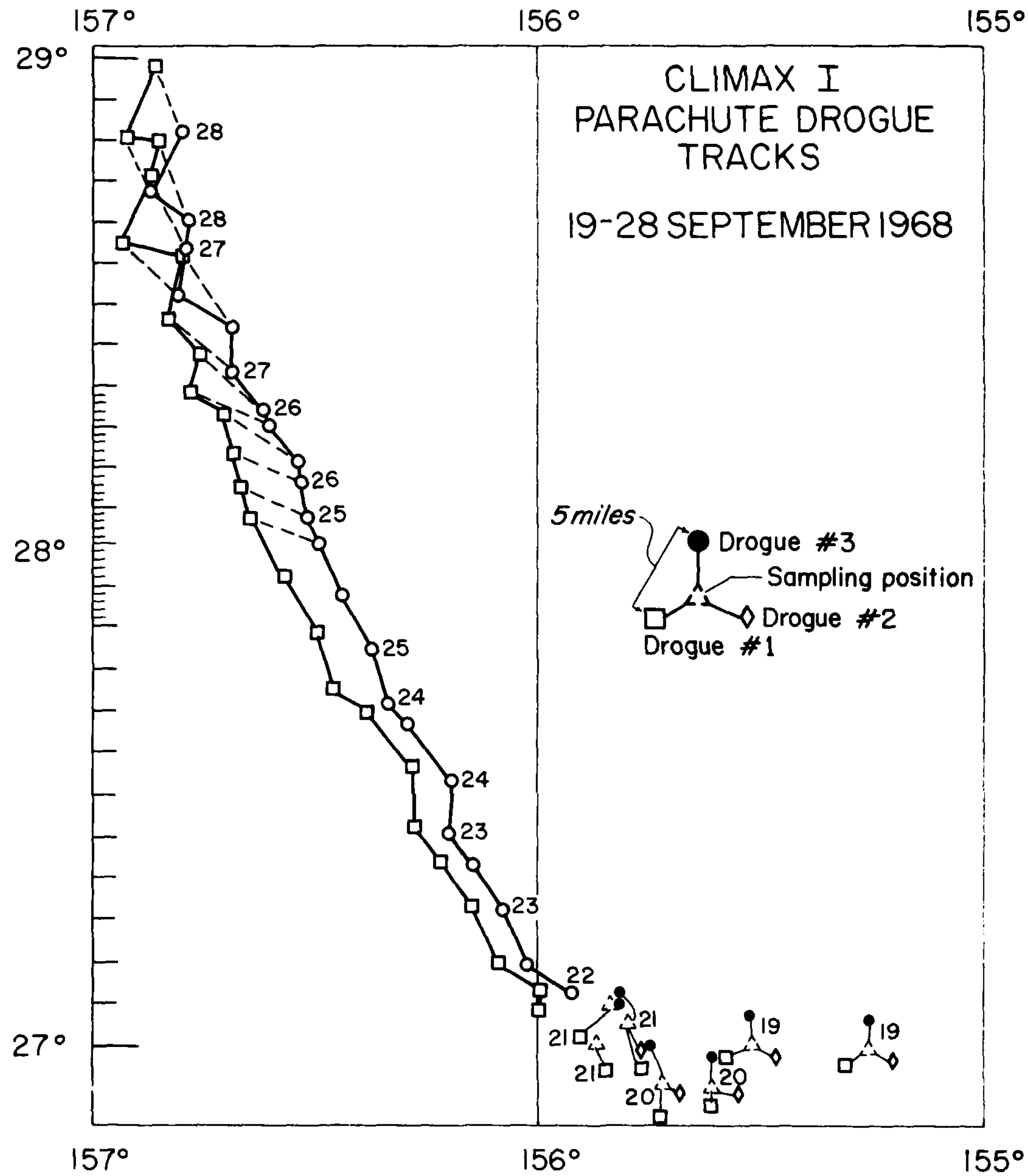
RV ARGO — CLIMAX I EXPEDITION — PUMP 4

LATITUDE	LONGITUDE	MO/DAY/YR	MESSENGER TIME		BOTTOM	WIND	SPEED	WEATHER	DOMINANT WAVES
28 43.0N	156 49.0W	09/28/68	1020	GMT		070	04KT	1	

Z	PO4	SIO3	NO2	NO3	NH4	CHLA	PHAE
0	.12	5.				.03	.05
10	.38	5.				.03	.01
25	.12	6.				.03	.02
35	.12	4.				.03	.03
50	.05	5.				.04	.02
60	.12	6.				.05	.03
75	.13	8.				.06	.03
100	.33	7.				.16	.21
125	.23	7.				.14	.21
150	.25	10.				.06	.11
200	.37	13.				.01	.02

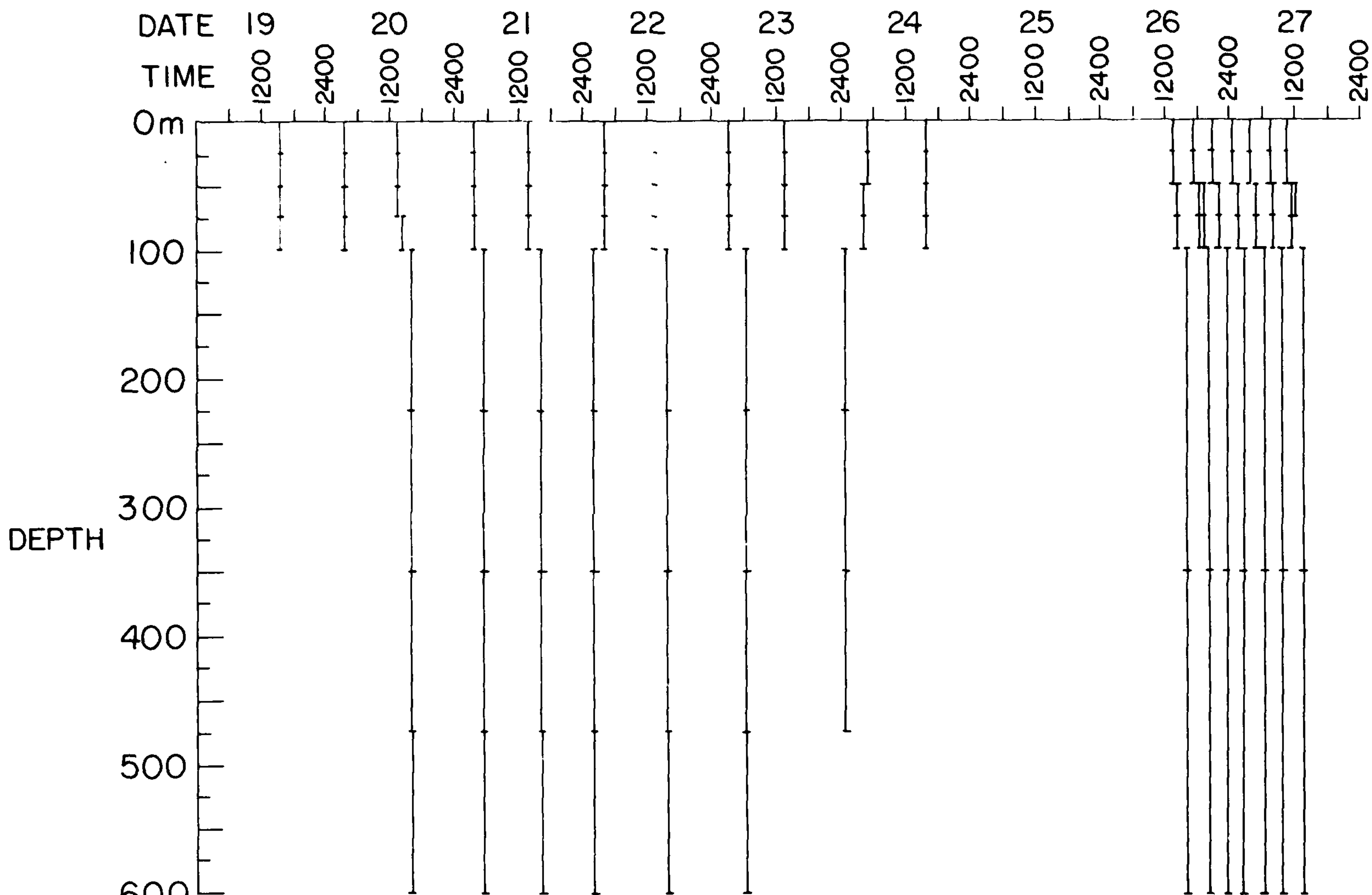
A) THESE CHLOROPHYLL A AND PHAEOPHYTIN SAMPLES WERE DRAWN FROM MICROZOOPLANKTON PUMP WATER.

BIOLOGICAL DATA



CLIMAX I
PARAPARACHUTE DROGUE
TRACKS
19-28 SEPTEMBER 1968
157°
156°
155°
29°
28°
27°
5 miles
Drogue #3
Sampling position
Drogue #2
Drogue #1
28
28
27
27
26
26
25
25
24
24
23
23
22
21
21
21
20
20
19
19

FIGURE 2



BONGO NET TOWS
CLIMAX I
SEPTEMBER 1968

FIGURE 3

Table 1

CLIMAX I WIND VELOCITY

Date 1968	Local Time	Direction degrees	Speed knots
Sept. 19	0600	095	18
	1200	100	15
	1800	075	13
	2400	100	12
Sept. 20	0600	115	13
	1200	150	5
	1800	110	10
	2400	120	15
Sept. 21	0600	105	8
	1200	145	8
	1800	120	5
	2400	145	5
Sept. 22	0600	120	4
	1200	120	4
	1800	125	5
	2400	090	6
Sept. 23	0600	090	8
	1200	120	6
	1800	-	0
	2400	040	2
Sept. 24	0600	030	6
	1200	045	5
	1800	070	8
	2400	090	14
Sept. 25	0600	060	12
	1200	050	10
	1800	060	9
	2400	090	12
Sept. 26	0600	090	14
	1200	090	8
	1800	065	12
	2400	090	8
Sept. 27	0600	070	5
	1200	045	5
	1800	070	6
	2400	070	8
Sept. 28	0600	060	4
	1200	045	6
	1800	115	8
	2400	120	11

Table 2

CLIMAX I DROGUE DATA

Date 1968	Local Time	Interval hours:min.	Distance naut. mi.	Speed knots
Sept. 19	0540	-	-	-
	1804	12:24	14.2	1.15
Sept. 20	0550	11:46	6.0	0.51
	1500	9:10	6.1	0.67
Sept. 21	0040	7:40	6.9	0.90
	1300	12:20	5.0	0.41
	1840	5:40	5.0	0.88
Sept. 22	0923	12:43	5.8	0.46
	1250	3:27	2.5	0.72
	1835	5:45	6.0	1.04
Sept. 23	0230	5:55	7.3	1.23
	1300	10:30	6.4	0.61
	1840	5:40	5.3	0.94
Sept. 24	0030	5:50	6.9	1.18
	1200	11:30	9.0	0.78
	1845	6:45	4.8	0.71
Sept. 25	0030	5:45	6.9	1.20
	0550	5:20	7.9	1.48
	1200	6:10	8.3	1.35
	1836	6:36	3.5	0.53
Sept. 26	0015	5:39	4.1	0.73
	0555	5:40	5.0	0.88
	1200	6:05	4.8	0.79
	1840	6:40	5.0	0.75
Sept. 27	0005	5:25	5.8	1.07
	0550	5:45	6.0	1.39
	1200	6:10	7.3	1.18
	1835	6:35	9.0	1.37
Sept. 28	0000	5:25	4.5	0.83
	0550	5:50	4.1	0.70
	1200	6:10	8.2	1.33

Table 3

CLIMAX I BONGO TOW AND MACROZOOPLANKTON BIOMASS

Date 1968	Local Time	Expected Depth (m) Fished	Side of Net R or L	Overall Reliability	Comments	Depth (m) if differs from exp'd.	Linear Meters Fished	Disp. Vol. (ml)	Biomass ml/1000 m^3
Sept. 19	1446-1525	25-0	L	useful	Net did not close		1540		
		25-0	R	good			1010	20	50
		50-25	L	useful	Net closed at surface	50-0	1664	25	38
		50-25	R	useful	Net closed at surface	50-0	1664	20	30
		75-50	L	poor	Came up open } Messenger might	75-0	2157	25	29
		75-50	R	poor	Came up cls'd } have hung up on net	75-0	1012	5	12
		100-75	L	poor	#2 (25-50m) therefore	100-75	1010	17.5	44
		100-75	R	poor	not opening net #3 (50-75m) and #4 (75-100m) at expected depth.	100-75	1010	17.5	44
Sept. 20	0326-0417	25-0	L	good			1015	65	162
		25-0	R	good			1015	32.5	81
		50-25	L	poor	Did not close	50-0	2465	52.5	54
		50-25	R	poor	Did not close	50-0	2465	45	46
		75-50	L	poor	Did not close } Messenger not	75-0	2850	42.5	38
		75-50	R	-	Did not open } released	-	-	-	-
		100-75	L	poor	Nets came up open. Although no mes-	100-0	3389		
		100-75	R	poor	senger hit this frame, nets apparently opened during ascent.	100-0	3389		
	1345-1358	25-0	L	good			1360	10	19
		25-0	R	good			1360	15	28
		50-25	L	good			1000	10	25
		50-25	R	good			1000	17.5	44
		75-50	L	good			1010	<5	<10
		75-50	R	good		73	1010	20	50
	1421-1441	100-75	L	good			1015	12.5	31
		100-75	R	good			1015	12.5	31
	1623-1644	225-100	L	good			1015	10	25
		225-100	R	good			1015	5	12
		350-225	L	good			1015	12.5	31
		350-225	R	good			1015	15	37
		475-350	L	good			1012	2.5	6
		475-350	R	good			1012	10	25
		600-475	L	good		626	1010	15	38
		600-475	R	poor	Hole in cod end		1010	<5	<10
Sept. 21	0250-0325	25-0	L	good			1015	40	100
		25-0	R	good			1015	30	75
		50-25	L	good			1015	12.5	31
		50-25	R	good			1015	25	62
		75-50	L	poor	Hole in cod end		1012	<5	<10
		75-50	R	good			1012	25	62
		100-75	L	good		108	1010	<5	<10
		100-75	R	good			1010	20	50
	0529-0600	225-100	L	good			1015	5	12
		225-100	R	good			1015	15	37
		350-225	L	poor	Net did not close	350-0	?	20	
		350-225	R	poor	Net did not close	350-0	?	30	
		475-350	L	good			1012	7.5	19
		475-350	R	good			1012	10	25
		600-475	L	-	Nets did not open	518	-	-	-
		600-475	R	-	Nets did not open	-	-	-	-
	1405-1431	25-0	L	good			1070	15	35
		25-0	R	good			1070	25	59
		50-25	L	useful	Nets did not close	50-0	2865	30	26
		50-25	R	useful	Nets did not close	50-0	2865	40	35

Date 1968	Local Time	Expected Depth (m) Fished	Side of Net R or L	Overall Reliability	Comments	Depth (m) if differs from exp'd.	Linear Meters Fished	Disp. Vol. (ml)	Biomass ml/1000 m^3
		75-50	L	useful	Nets apparently worked but note		1012	2.5	6
		75-50	R	useful	large difference in L/R volumes		1012	20	50
		100-75	L	good		104	1015	<5	12
		100-75	R	good			1015	<5	12
	1638-1656	225-100	L	good			1015	7.5	19
		225-100	R	good			1015	7.5	19
		350-225	L	good			1012	5	12
		350-225	R	good			1012	5	12
		475-350	L	good			1010	5	12
		475-350	R	good			1010	10	25
		600-475	L	good			1510	10	17
		600-475	R	good			1510	10	17
Sept. 22	0214-0234	225-100	L	good			1015	15	37
		225-100	R	good			1015	10	25
		350-225	L	good			1400	10	18
		350-225	R	good			1400	10	18
		475-350	L	poor	Hole in cod end		1012	<5	<10
		475-350	R	good			1012	5	12
		600-475	L	poor	Hole in cod end		1010	<5	<10
		600-475	R	good		612	1010	2.5	6
	0408-0445	25-0	L	good			1015	30	75
		25-0	R	good			1015	22.5	56
		50-25	L	good			1400	35	63
		50-25	R	good			1400	5	9
		75-50	L	poor	Hole in cod end		1012	<5	<10
		75-50	R	good			1012	30	75
		100-75	L	poor	Hole in cod end		1010	<5	<10
		100-75	R	good		102	1010	22.5	56
	1345-1417	25	L	useful			1015	17.5	44
		25	R	useful	This cast did not "start up" until 10		1015	15	37
		50	L	useful	min. after the messenger time, thus		1400	35	63
		50	R	useful	these are essentially horizontal tows		1400	30	54
		75	L	useful	at the maximum depths.		1012	<5	<10
		75	R	useful			1012	12.5	31
		100	L				975	-	-
		100	R				975	<5	<10
	1543-1615	225-100	L	good	Nets apparently worked but note		1015	7.5	19
		225-100	R	good	large difference in L/R volumes		1015	20	50
		350-225	L	good			1400	5	9
		350-225	R	good			1400	7.5	14
		475-350	L	good			1012	<5	<10
		475-350	R	good			1012	5	12
		600-475	L	good			1010	<5	<10
		600-475	R	good			1010	<5	<10
Sept. 23	0247-0330	25-0	L	good			1510	15	25
		25-0	R	good			1510	27.5	46
		50-25	L	good			940	22.5	60
		50-25	R	-	Sample lost		940	-	-
		75-50	L	poor		?	?	55	
		75-50	R	poor	Post trip--nets fished shallower	?	?	<5	
		100-75	L	useful	layer	25-0	243	7.5	78
		100-75	R	useful		25-0	243	5	
	0557-0630	225-100	L		Wire clamp failed, net slid down wire	?		5	
		225-100	R		Wire clamp failed, net slid down wire	?			

Date 1968	Local Time	Expected Depth (m) Fished	Side of Net R or L	Overall Reliability	Comments	Depth (m) if differs from exp'd.	Linear Meters Fished	Disp. Vol. (ml)	Biomass ml/1000 m^3
		350-225	L		Wire clamp failed, net slid down wire	?		10	
		350-225	R		Net failed to close; see above	?		20	
		475-350	L	?	May be useable but see above		1012	15	37
		475-350	R	?	May be useable but see above		1012	10	25
		600-475	L	?	May be useable but see above		1015	<5	<10
		600-475	R	?	May be useable but see above		1015	<5	<10
	1324-1345	25-0	L	good			1015	10	25
		25-0	R	good			1015	10.5	26
		50-25	L	poor	Net torn		1410	10	18
		50-25	R	good			1410	22.5	40
		75-50	L	poor	Net torn		1012		
		75-50	R	good			1012	10	25
		100-75	L	-	Net apparently worked but no sample			-	-
		100-75	R	useful	Net came up open	100-0	3882	7.5	5
Sept. 24	0046-0111	225-100	L	good			1015	12.5	31
		225-100	R	good			1015	10	25
		350-225	L	good			1012	5	12
		350-225	R	good			1012	2.5	6
		475-350	L	good			1010	5	12
		475-350	R	-	Net apparently worked but no sample		1010		
	0413-0500	75-50	L	useful	Did not close	75-0	2773	30	27
		75-50	R	useful	Did not close	75-0	2773	25	23
		100-75	L	good	Nets apparently worked but note		1010	10	25
		100-75	R	good	large difference in L/R volumes		1010	<5	<10
	0507-0540	25-0	L	useful	Net did not close		3420	50	37
		25-0	R	useful	Net did not close		3420	60	44
		50-25	L	good			1015	10	25
		50-25	R	good			1015	12.5	31
	1546-1630	25-0	L	good			1015	20	50
		25-0	R	good			1015	32.5	81
		50-25	L	good			1400	<5	<10
		50-25	R	good			1400	5	9
		75-50	L	good	Nets apparently worked but note		1012	2.5	6
		75-50	R	good	large difference in L/R volumes		1012	10	25
		100-75	L	good	Nets apparently worked but note		1010	15	37
		100-75	R	good	large difference in L/R volumes		1010	2.5	6
Sept. 26	1337-1353	25-0	L	good			1015	12.5	31
		25-0	R	good			1015	5	12
		50-25	L	good			1010	10	25
		50-25	R	good			1010	17.5	44
	1444-1506	75-50	L	good			1010	17.5	44
		75-50	R	good			1010	15	38
		100-75	L	good			1015	5	12
		100-75	R	good			1015	10	25
	1553-1620	350-100	L	-	Net lost		1015	-	-
		350-100	R	good			1015	10	25
		600-350	L	good			1010	10	25
		600-350	R	good			1010	10	25
	1656-1721	25-0	L	good			1010	10	25
		25-0	R	good			1010	22.5	56
		50-25	L	good			1015	15	37
		50-25	R	good			1015	20	50

Date 1968	Local Time	Expected Depth (m) Fished	Side of Net R or L	Overall Reliability	Comments	Depth (m) if differs from exp'd.	Linear Meters Fished	Disp. Vol. (ml)	Biomass ml/1000m^3
	1758-1821	75-50	L	poor	Net did not close	75-0		30	
		75-50	R	poor	Net did not close	75-0		10	
		100-75	L	poor	Net did not close	100-0		2.5	
		100-75	R	poor	Net did not close	100-0		5	
	1859-1922	75-50	L	good			1015	15	37
		75-50	R	good			1015	15	37
		100-75	L	good			1010	12.5	31
		100-75	R	good			1010	10	25
	2010-2033	350-100	L	good			1015	10	25
		350-100	R	good			1015	10	25
		600-350	L	good			1010	5	12
		600-350	R	good			1010	7.5	19
	2118-2137	25-0	L	good			1010	45	113
		25-0	R	good			1010	35	81
		50-25	L	good			1015	15	37
		50-25	R	good			1015	17.5	44
	2206-2230	75-50	L	good			1015	15	37
		75-50	R	good			1015	22.5	56
		100-75	L	good	Nets apparently worked but note		1010	7.5	19
		100-75	R	good	large difference in L/R volumes		1010	55	138
	2328-2351	350-100	L	good	Nets apparently worked but note		1010	2.5	6
		350-100	R	good	large difference in L/R volumes		1010	20	50
		600-350	L	good			1015	2.5	6
		600-350	R	good			1015	<5	<10
Sept. 27	0040-0103	25-0	L	good			1015	15	37
		25-0	R	good			1015	25	62
		50-25	L	good	Nets apparently worked but note		1010	<5	<10
		50-25	R	good	large difference in L/R volumes		1010	15	37
	0126-0156	75-50	L	good			1010	22.5	
		75-50	R	good			1010	20	50
		100-75	L	poor	Hole in cod end		1015	2.5	6
		100-75	R	good			1015	20	50
	0237-0255	350-100	L	good			1015	7.5	19
		350-100	R	good			1015	7.5	19
		600-350	L	good			1010	10	25
		600-350	R	good			1010	5	13
	0341-0404	25-0	L	good			1010	30	75
		25-0	R	good			1010	22.5	56
		50-25	L	good			1015	12.5	31
		50-25	R	good			1015	15	37
	0449-0[illegible]0	75-50	L	useful			1015	10	25
		75-50	R	useful	Net lost		1010		
		100-75	L	useful			1010	22.5	56
		100-75	R	useful			1010	20	50
	0606-0633	350-100	L	good			1010	10	25
		350-100	R	good			1010	10	25
		600-350	L	good			1015	10	25
		600-350	R	good			1015	5	12

Date 1968	Local Time	Expected Depth (m) Fished	Side of Net R or L	Overall Reliability	Comments	Depth (m) if differs from exp'd.	Linear Meters Fished	Disp. Vol. (ml)	Biomass ml/1000m^3
	0804-0838	75-50	L	poor	Hole in cod end		1015	15	38
		75-50	R	good			1015	10	25
		100-75	L	?			1010	<5	<10
		100-75	R	good			1010	25	62
	0929-0953	350-100	L	good			1010	7.5	19
		350-100	R	good			1010	5	13
		600-350	L	good			1050	7.5	18
		600-350	R	good			1050	5	12
	1044-1100	25-0	L	good			985	7.5	19
		25-0	R	good			985	5	13
		50-25	L	good	Nets apparently worked but note		1010	<5	<10
		50-25	R	good	large difference in L/R volumes		1010	15	38
	1133-1200	75-50	L	useful	Net did not close	75-0	1010	37.5	94
		75-50	R	useful	Net did not close	75-0	1010	30	75
		100-75	L	good	Net hung up on wire; note difference		1015	10	25
		100-75	R	useful	in L/R volumes		1015	<5	<10
	1228-1250	75-50	L	good			1010	17.5	41
		75-50	R	good			1010	20	50
	1332-1350	350-100	L	good			1015	2.5	6
		350-100	R	good			1015	5	12
		600-350	L	good			1010	<5	<10
		600-350	R	good			1010	10	25

Table 4

CLIMAX I WATER TRANSPARENCY

Date 1968	Local Time	Solar Elevation degrees	Wind dir(°)	Wind speed(kts)	Clouds[a)] type	Clouds[a)] amount	Sea	Swell dir(°)	Swell hght(ft)	Secchi Disc Depth (m)	K[b)] (m^{-1})
Sept. 19	1125-1225	64	120	14	8,4,2	2	Moderate	090	4	32	.060

Depth (m)	E_o[c)]	E_{dw}[d)]/E_o[e)] (%)
0	-	68.2
3.4	[illegible]230	43.0
7.9	64[illegible]0	31.1
10.1	7380	23.8
13.4	7404	21.7
20.1	12000+	19.3
21.3	9204	19.3
26.2	5868	7.80
32.0	9040	6.39
41.5	7350	3.92
50.3	12000+	3.86
58.8	12000+	2.25
74.7	12000+	1.05
93.7	11160	0.37
113.4	10400	0.15

Date 1968	Local Time	Solar Elevation degrees	Wind dir(°)	Wind speed(kts)	Clouds type	Clouds amount	Sea	Swell dir(°)	Swell hght(ft)	Secchi Disc Depth (m)	K (m^{-1})
Sept. 21	1215-1240	65	170	10	8	4	Slight	120	4	34	.047

Depth (m)	E_o	E_{dw}/E_o (%)
0	2055	60.8
9.5	2225	26.2
19.5	4140	15.6
40.0	12000+	6.41
64.8	3165	2.05
49.1	12000+	4.63
29.6	12000+	10.5
18.9	4670	17.4
9.2	12000+	28.7

Date 1968	Local Time	Solar Elevation degrees	Wind dir(°)	Wind speed(kts)	Clouds type	Clouds amount	Sea	Swell dir(°)	Swell hght(ft)	Secchi Disc Depth (m)	K (m^{-1})
Sept. 28	1210-1300	54	050	4	8	2	Slight	020	3	-	.048

Depth (m)	E_o	E_{dw}/E_o (%)
0	8570	58.7
5.0	11250	31.8
10.4	11300	30.0
15.5	10850	23.7
20.8	11000	17.1
29.9	10900	11.1
39.6	10800	6.89
50.0	10900	2.98
60.8	10750	2.56
68.3	10800	1.73
50.0	10750	4.27
29.6	10700	12.4
10.7	10700	33.1

a) Cloud data are coded using the National Oceanographic Data Center (NODC) method.
b) K is defined as $I = I_o e^{-kz}$
c) E_o=Incident light radiation in foot-candles (cosine collector on ship, above surface)
d) E_{dw}=Downwelling radiation at depth Z (cosine collector)
e) E_{dw}/E_o at Z=0 gives loss of light at the air-sea interface

Table 5

CLIMAX I PRIMARY PRODUCTIVITY

Date 1968	Depth meters	Chlorophyll-a mg/m^3	Phaeophytin mg/m^3	Productivity mg $C/m^3/hr.$	Productivity per unit Chloro-a mg C/hr./mg-Chl-a	Integrated Water Column Productivity mg $C/m^2/12$ hr. day
Sept. 19	0	.0359	.0347	.161	4.48	
	23	.0442	.0269	.209	4.72	
	33	.0414	.0257	.261	6.30	156.0
	49	.0529	.0290	.223	4.21	
	60	.0602	.0303	.116	1.92	
	74	.0694	.0387	-.002	-.028	
Sept. 20	0	.0366	.0238	.239	6.53	
	23	.0320	.0159	.274	8.56	
	33	.0285	.0195	.261	9.15	189.6
	49	.0489	.0244	.346	7.07	
	60	.0605	.0314	.185	3.05	
	74	.0695	.0442	.043	.618	
Sept. 21	0	.0205	.0156	.211	10.29	
	23	.0330	.0146	.323	9.78	
	33	.0302	.0128	.393	11.35	240.0
	49	.0400	.0165	.326	8.15	
	60	.0495	.0195	.221	4.26	
	74	.0585	.0262	.068	1.16	
Sept. 22	0	.0285	.0116	.212	7.43	
	23	.0327	.0113	.268	8.19	
	33	.0338	.0102	.337	9.97	180.0
	49	.0392	.0116	.329	8.39	
	60	.0534	.0200	.111	2.07	
	74	.0467	.0155	.010	.214	
Sept. 23	0	.0224	.0151	.215	9.59	
	23	.0179	.0160	.260	14.52	
	33	.0249	.0132	.249	10.00	180.0
	49	.0311	.0138	.254	8.16	
	60	.0383	.0214	.127	3.31	
	74	.0604	.0443	.014	.23	
Sept. 24	6	.0320	.0159	.322	10.06	
	26	-	-	.268	-	
	38	.0377	.0146	.202	5.35	228.0
	57	.0572	.0277	.209	3.65	
	70	.0692	.0287	.152	2.19	
	88	.0712	.0408	.030	.42	
Sept. 25	5	.0329	.0209	.241	7.32	
	25	.0240	.0229	.225	9.37	
	36	.0169	.0124	.321	18.99	192.0
	54	.0356	.0339	.198	5.56	
	66	.0196	.0156	.138	7.04	
	82	.0570	.0622	.006	.105	

Table 6

CLIMAX I CHLOROPHYLL-A AND PHAEOPHYTIN

Date 1968	Local Time	Depth meters	Chlorophyll-a μg/L	Phaeophytin μg/L
Sept. 20	1030	0	.0161	.0134
		10	.0130	.0121
		20	.0074	.0078
		35	.0096	.0091
		50	.0021	.0239
		75	.0192	.0031
		100	.0053	.0334
		125	.0064	.0448
		150	.0010	.0271
		200	.0011	.0144
Sept. 21	1000	0	.0264	.0113
		10	.0181	.0272
		25	.0228	.0104
		35	.0325	.0230
		50	.0420	.0205
		60	.0503	.0317
		75	.0676	.0319
		100	.1214	.1605
		125	.1206	.1742
		150	.0370	.0648
		200	.0070	.0152
Sept. 22	-	150	.0436	.0729
		200	.0021	.0128
Sept. 22	2400	0	.0500	.0239
		10	.0194	.0174
		25	.0215	.0221
		35	.0549	.0719
		75	.0559	.0391
		100	.1396	.2653
		110	.1757	.2175
		125	.1057	.2061
		150	.0237	.0502
		200	.0107	.0217
Sept. 24	0900	0	.0538	.0269
		10	.0351	.0252
		25	.0361	.0210
		35	.0323	.0174
		50	.0504	.0272
		60	.0699	.0365
		75	.0771	.0586
		100	.1794	.2089
		125	.0449	.0765
		150	.0224	.0425
		200	.0024	.0112

Date 1968	Local Time	Depth meters	Chlorophyll-a μg/L	Phaeophytin μg/L
Sept. 25	2000	20	.0247	.0106
		40	.0262	.0129
		60	.0395	.0153
		80	.0480	.0499
		90	.0542	.0981
		100	.1424	.1791
		110	.1376	.1945
		120	.0984	.1430
		160	.0154	.0244
		180	.0087	.0208
		200	.0089	.0194
		230	.0069	.0127
		260	.0024	.0084
		290	.0019	.0050
		320	.0014	.0055
		350	.0028	.0027
Sept. 27	1900	300	.0000	.0125
		400	.0014	.0050
		500	.0005	.0067
		600	.0010	.0048
		800	.0004	.0044
		1000	.0005	.0049
Sept. 28	0100	0	.0286	.0477
		10	.0311	.0133
		25	.0279	.0154
		35	.0267	.0257
		50	.0405	.0229
		60	.0490	.0246
		75	.0614	.0328
		100	.1631	.2137
		125	.1439	.2192
		150	.0626	.1059
		200	.0103	.0218

Table 7

CLIMAX I CHLOROPHYLL PROFILE DATA

Date 1968	Local Time	Depth of Maximum Layer (m)	Estimated Depth Lag: Pump to Fluorometer (m)	Maximum Value (0-100 scale) Door 10	Surface Value (0-100 scale) Door 10	Character of Maximum Value	Depth Range of Sample	Comments
Sept. 18	2134	84	54	34.0	19.3	Single max. value	0-140	Poor depth Correlation
Sept. 19	1719	84	54	26.5	11.3	Possibly double	0-110	Short scale
Sept. 20	2136	-	-	-	8.8	-	Surface	Break in hose
Sept. 20	2312	90	54	30.1	8.0	Single	0-230	Short scale
Sept. 21	2123	-	-	-	10.5	-	Surface	Poor record
Sept. 21	2335	90	54	36.8	15.6	Single	0-230	Short scale
Sept. 22	2351	101	54	18.9	13.0	Single	0-230	Salinity samples enabled good depth correlation
Sept. 23	2025	108	54	24.1	10.0	Single	0-156	
Sept. 24	0900	109	54	38.1	23.5	Single	0-176	
Sept. 25	0320	-	-	-	6.6	-	Surface	Poor record
Sept. 25	0800	101	54	35.2	15.5	Single	0-240	Severe hose angle
Sept. 26	0830	91	54	38.3	10.5	Single	0-225	Salinity samples taken at 128-225m
Sept. 27	2400	99-105	54	34.0	8.0	Single	0-200	

Table 8

CLIMAX I BIRD AND FISH SIGHTINGS

Date 1968	Local Time	Description	Number
Sept. 19	1200	Red-tailed Tropic bird	1
	1830	White-tip shark, 5ft	1
Sept. 20	1200	White-tailed Tropic bird	1
	1340	White-tailed Tropic bird	1
	1345	White-tailed Tropic bird	1
	all day	Flights of 5-20 small birds heading South about 7-15ft above water; possibly Golden Plover	
Sept. 21	1130	White-tip shark, 6ft	1
	1310	Dolphinfish	5
	1315	Black-footed Albatross	1
	1345	Golden Plover	1
	1510	Skipjack	40-50
	1700	Dolphinfish	1
	1800	White-tailed Tropic bird	1
Sept. 22	0658	Golden Plover	1
	0830	Frigate birds	2
	0845	Sooty Shearwater	2
	0915	Dolphinfish	5
	1345	Golden Plover	2
	1710	Golden Plover	1
Sept. 23	0630	Golden Plover	2
	0715	Golden Plover	10
	0730	Golden Plover	12
	0915	White-tailed Tropic bird	1
	0930	Sooty Shearwater	2
	1008	Golden Plover	3
	1330	White-tailed Tropic bird	1
	1330	Golden Plover	4
	1425	Sooty Shearwater	1
	1500	Frigate bird	1
	1630	Red-footed Booby	1
Sept. 24	1210	Golden Plover	3
	1215	Golden Plover	9
	1430	Pelagic Triggerfish	5
	1600	White-tailed Tropic bird	1
Sept. 26	0610	Golden Plover	1
	1345	Red-tailed Tropic bird and White-tailed Tropic bird flying together	1 each
	1820	Golden Plover	2
Sept. 27	0200	Shark (White-tip?)	1
	0650	Golden Plover	1
	0730	Wedge-tailed Shearwater	2
	0940	Golden Plover	1

Table 9

CLIMAX I FISH CATCHES

Date 1968	Local Time	Species	Weight (lbs.)	Length (ins.)
Sept. 20	1500	Dolphinfish		
	2330	"	12	36
Sept. 21	1400	"	15	37
	1400	"	11	32
	1730	"	15	36
Sept. 22	0915	"	8	30
Sept. 23	0200	"	4	24
Sept. 24	1800	"	10	32
	2230	" , (four)	8	30
Sept. 25	1000	"	8	30
	1200	"	8	30
Sept. 26	0630	"	8	30
Sept. 28	1700	"	?	?

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Mazatlan, Sinaloa, Mexico

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California State Fisheries Lab.
350 Golden Shore
Long Beach, Calif. 90802

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Deutsche Demokratische Republik
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Deutsches Hydrographisches Institut
Bernhard-Nocht-Str. 78
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Marine Occupations Program
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Arcata, Calif. 95521

Dr. Robert H. Gibbs, Jr.
Division of Fisheries
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Dr. Donn S. Gorsline
Department of Geology
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Dr. William J. Hargis, Jr.,
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Gloucester Point, Va. 23062

Mr. Koji Hidaka
Ocean Research Institute
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Nakano, Tokyo, Japan

Mr. T. Hirano
Tokai Regional Fisheries
Research Laboratory
5, Kachidoki, Chuo-ku
Tokyo, Japan

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Intersea Research Corp.
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Japan Meteorological Agency
Oceanographical Section
Tokyo, Japan

Japan Oceanographic Data
Center
Hydrographic Division
Maritime Safety Agency
No. 3-1, 5-Chome, Tsukiji,
Chuo-ku
Tokyo, Japan

Editor
Journal of Marine Research
Box 2161, Yale Station
New Haven, Conn. 06520

Mr. Larry Kiml, Director
Water and Natural Resource
Depts.
Calif. State Chamber of
Commerce
455 Capitol Mall, Suite 300
Sacramento, Calif. 95814

Dr. H. Kitamura
Oceanographic Section
Kobe Marine Observatory
Kobe, Japan

Dr. E. C. LaFond
Code 50401
Naval Undersea Center
San Diego, Calif. 92132

Mr. Owen S. Lee
Program Manager for Physical
Oceanography
Code 504
Naval Undersea Center
San Diego, Calif. 92132

Dr. Alfred J. Carsola
Lockheed Marine Laboratory
3380 N. Harbor Drive
San Diego, Calif. 92101

Dr. Yuan-Hui Li
Hoffman Laboratory
Harvard University
20 Oxford Street
Cambridge, Mass. 02138

Mr. Jotaro Masuzawa
Oceanographical Section
Japan Meteorological Agency
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Santa Cruz, Calif. 95064

Dr. Robert M. Norris
Department of Geology
University of California
Santa Barbara, Calif. 93106

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Portland, Ore. 97200

Dr. Robert G. Paquette
Dept. of Oceanography
U. S. Naval Postgraduate
School
Monterey, Calif. 93940

Director
San Diego Society of
Natural History
P. O. Box 1390
San Diego, Calif. 92112

Dr. G. L. Pickard
Institution of Oceanography
University of British
Columbia
Vancouver 8, B.C., Canada

Dr. D. W. Pritchard, Director
Chesapeake Bay Institute
The Johns Hopkins University
Oceanography Building
Baltimore, Md. 21218

Mr. D. W. Privett, Librarian
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Science
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Surrey, England

Publications Office (2)
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Dr. Ricardo M. Pytkowicz
Department of Oceanography
Oregon State University
Corvallis, Ore. 97331

Mr. John Radovich, Head
Operations Research Branch
Department of Fish & Game
1416 Ninth Street
Sacramento, Calif. 95814

Mr. Gunnar I. Roden
Department of Oceanography
University of Washington
Seattle, Wash. 98195

Enviromental Prediction
Research Facility
U. S. Naval Postgraduate
School
Monterey, Calif. 93940

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Mr. Daitaro Shoji
Oceanographic Section
Japanese Hydrographic Office
5-chome, Tsukiji, Chuo-ku
Tokyo, Japan

Mr. J. C. Simpson, Project Manager
Fisheries Research and Development Project
Apartado 2578
Caracas, Venezuela

Mr. Edmund H. Smith, Director
Pacific Marine Station
Dillon Beach, Calif. 94929

Dr. Reimer Simonsen
Institut fur Meeresforschung
285 Bremerhaven
Am Handelshafen 12
Bundesrepublik
Deutschland (West Germany)

Director
Institute of Marine Science
University of Miami
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Miami, Fla. 33149

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Prof. Henry M. Stommel
Mass. Institute of Technology
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Cambridge, Mass. 02139

Dr. Arthur D. Stump
Department of Chemistry
San Jose State University
San Jose, California 95100

Dr. Bruce A. Taft
Department of Oceanography
University of Washington
Seattle, Wash. 98195

Dr. Norman Tebble, Director
The Royal ˉcottish Museum
Chambers Street
Edinburgh, Scotland

Department of Oceanography
Texas A. and M. University
College Station, Texas 77843

Mr. A. J. Thomson
Official Secretary
New South Wales Government Offices
56, Strand
London, W. C. 2, England

Dr. R. B. Tibby
Hancock Foundation
University of Southern Calif.
University Park
Los Angeles, Calif. 90007

Librarian
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Southeast Fisheries Center, NMFS
75 Virginia Beach Drive
Miami, Fla. 33149

Dr. M. Uda
College of Marine Science and Technology
Tokai University
1000 Orido, Shimizu-shi
Shizuoka-ken, Japan

Commanding Officer
USCG Oceanographic Unit
Bldg. 159-E, Navy Yard Annex
Washington, D. C. 20390

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U. S. Coast and Geodetic Survey
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Chief, Branch of Marine Fisheries
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NMFS, NOAA
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Dr. C. S. Wong, Head
Ocean Chemistry Division, Pac. Region, Mar. Sci. Branch, Dept. of the Environment
1230 Government Street
Victoria, B. C., Canada
V8W 1Y4

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Woods Hole, Mass. 02543

Mr. Hajime Yamanaka
High Seas Fisheries Research Lab.
Orido 1000, Shimizu
Shizuoka-ken, Japan

Dr. Kozo Yoshida
Geophysical Inst.
University of Tokyo
Hongo, Tokyo, Japan